UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING
Washington, D. C.

FIELD LETTER No. 84.
December 15, 1917.

Logan Waller Page, Director.
P. St.J. Wilson, Chief Engineer; J. E. Pennybacker, Chief of Management; Samuel Fortier, Chief of Irrigation Investigations; S. H. McCrory, Chief of Drainage Investigations; E. B. McCormick, Chief of Rural Engineering; Prevost Hubbard, Chief of Tests.

FEDERAL AID
Administration

Under date of November 8, the Secretary amended Regulation 6, Section 1, of the Rules and Regulations, so as to permit payment for construction work done on projects prior to the execution of the project agreement in the case of projects for which project statements were approved prior to November 1, 1917. This was done in order that payment might be made for work which was being done on Louisiana project No. 13, which leads from the city of Alexandria to the army cantonment at that place.

Under date of November 15, the Secretary amended Regulation 5, Section 7, of the Rules and Regulations, so that minor alterations in the plans, specifications, and estimates, after they have been approved by the Secretary, may be made with the approval of the Director of the Office of Public Roads and Rural Engineering, provided such changes involve no increase in the cost of the project to the Federal Government.

Projects.

Forty new project statements were submitted in November as follows: Alabama Nos. 18, 26, 27, 28 and 29; Arkansas No. 8; Colorado Nos. 7 and 8; Iowa Nos. 2, 7, 8 and 9; Louisiana No. 14; Maine No. 3; Michigan Nos. 7 and 10; Minnesota No. 6; Mississippi Nos. 9, 10, 11, 12 and 13; Nebraska No. 2; Nevada Nos. 1, 2, 3, and 4; New Mexico Nos. 5, 6, 7, 8, 9, 10 and 11; New York No. 5; Pennsylvania Nos. 5, 6, and 7, and Texas Nos. 5 and 6.

NOTE: New York No. 5 was recalled by District Engineer on advice of State Highway Department to be either restated or cancelled.

The Secretary approved the following projects in November: Alabama Nos. 18, 27, and 29; Colorado Nos. 7 and 8; Florida No. 2; Idaho No. 2; Iowa Nos. 3 and 5; Louisiana Nos. 1, 7 and 12; Minnesota No. 6; Mississippi No. 11; Missouri No. 1; New Jersey No. 1; New Mexico No. 7; North Carolina No. 11; Ohio No. 6; Oklahoma No. 2; South Carolina Nos. 4 and 5; Washington No. 7, and Wyoming Nos. 10 and 12, a total in all of 26 projects.

The number of Federal aid projects approved or pending on November 30 was 223. These represented a total length of 2,333.869 miles with an estimated cost of $13,063,437.83, of which $5,481,205.11 was Federal aid. The number of projects which had been approved by the Secretary on this date was 166, which had a total length of 1,549.645 miles. These projects approved by the Secretary were estimated to cost $9,702,378.69 and the amount of Federal aid approved was $4,026,068.25

National Forest Roads.

Six preliminary investigation reports and two reconnaissance survey reports were received in November. Preliminary investigation reports for these projects having a total length of 221.3 miles, for which the estimated cost was $674,269.48, and 28 reconnaissance survey reports having a total length of 718.76 miles, for which the estimated cost was $3,254,665.25, had been received by the Chief Engineer up to November 30.

Headquarter News.

All of the District Engineers were in conference at headquarters during the week of December 1.

The Office was well represented at the meeting of the State Highway Officials Association at Richmond on December 4-6, inclusive. Mr. Page delivered an address on "One Year's Experience with the Federal Aid Road Act." The Chief Engineer, Chief of Management, Assistant Chief Engineer, and the ten District Engineers attended the meetings of the Association.

District News.

District Engineer Hewes returned from a trip to Alaska on November 9. During his absence B. J. Finch, Senior Highway Engineer, was in charge of the Portland Office.

District Engineer Sweetser reported a request from Sonoma County, California, for the assignment of an engineer to make a road study of the county.

District Engineer Whittaker reports the award of the contract for Colorado Project No. 1 to Charles Connor for the sum of $73,939.74.

C. G. Morrison, Senior Highway Engineer, has been assigned to the Denver Office.

P. B. Whitney, Junior Highway Engineer, resigned November 30.

The construction of the Winslow-Long Valley Road has been completed.

The grading work on Minnesota Project No. 2 is almost completed. Work has started on Minnesota Project No. 13.

H. K. Craig, Highway Engineer, has been transferred from Little Rock, Arkansas to Albuquerque, New Mexico.

H. C. Wells, Highway Engineer, has been assigned to Arkansas and spent most of the month advising with the highway commission and inspecting Arkansas projects.

District Engineer Fauntleroy attended a meeting of the Jefferson Highway Association at Denison, Texas on November 23, and delivered an address on "Government Cooperation in Road Building".

The District Engineer's office in Fort Worth, Texas, has moved into new quarters, and is now located in the Wheat Building.

District Engineer Voshell has submitted Illinois Project No. 1, which has a gross length of 123.25 miles extending almost entirely across northern Illinois.

C. E. Raynor, Senior Highway Engineer, reported at the Montgomery office, November 15.

Virginia Project No. 5 was approved by the Secretary December 12, which was about 8 days from the time it was received by the District Engineer. The project was inspected prior to the submission of the project statements, so that no delay was occasioned in the District Office.

A. R. Losh, engineer economist, has been transferred from District No. 10 to the Chief Engineer's office.

J. C. Carpenter, Highway Engineer, was on sick leave for several weeks, but has returned to his work again.

CONSTRUCTION AND MAINTENANCE.

J. J. Tobin, Engineer Economist, having finished his assignment at Camp Devens has returned to this Office and is now working on economic highway Surveys.

G. T. MacNab, Senior Highway Engineer, has been assigned to assist the Ordnance Department in the road work at Gun Powder Neck, Md.

C. L. Brown, Senior Highway Engineer, has been assigned to the road work at the Marine Corps Cantonment at Quantico, Virginia. For a time the concrete pavement was being laid at the rate of 500 linear feet per day (1,000 square yards) but this record has not been maintained due to bad weather and trouble with machinery.

J. W. Ball, Junior Highway Engineer, assisted U. S. Marshall, Senior Highway Engineer, on the cantonment work at American Lake.

G. D. Whittle, Highway Bridge Engineer, advised with the State Highway Commission of Louisiana on the preparation of bridge and culvert plans.

HIGHWAY SURVEYS AND ECONOMICS.

M. O. Eldridge was in Hartford, Providence, Boston, Albany, and Poughkeepsie in connection with road mapping being done by this Office, and consulted with the various highway officials of these states regarding the work.

The field survey work which has been carried on by W. E. Rosengarten and W. H. Barton in Connecticut has been completed. They have returned to the Office and are now engaged in writing up their reports.

Maintenance Studies.

J. L. Harrison spent the month of November in the southern and Pacific states studying maintenance problems and questions involved in the management and organization of state offices.

State Management and Procedure Studies.

The state management and procedure bulletin which is being prepared by M. O. Eldridge and G. G. Clarke is rapidly nearing completion.

Publications.

Farmers' Bulletin No. 866, "Use of Windmills in Irrigation in the Semi-arid West".

Farmers' Bulletin No. 882, "Irrigation of Orchards."

Journal American Research, "Run-off from the Drained Prairie Lands of Southern Louisiana."

Department Bulletin No, 555, "Standard Forms for Specifications, Tests, etc."

Exhibits.

National Farm and Live Stock Show, New Orleans, Louisiana, November 17-25.

Chamber of Commerce, Charlottesville, Virginia, November 7-14.

TESTS AND RESEARCH.

Administration.

On November 7, Mr. Hubbard inspected Arkansas Federal Aid Project No. 2, lying between Little Rock and Camp Pike.

The Division of Tests and Research has devoted considerable time in the last few months to reviewing specifications for Federal Aid projects particularly with reference to the specification of materials. It is expected that the new typical specifications for bituminous materials prepared in the Office will be available for distribution shortly after January 1.

Routine Tests and Analysis.

In November 47 samples of bituminous materials were examined in the Chemical Laboratory; 66 samples of rock, sand, gravel, etc., were examined in the Physical Laboratory, and 59 samples were examined and classified in the Microscopic Laboratory.

Research upon the Properties Of Dust Preventives and Road Binders.

Investigations were made upon the thickness of bituminous films on various mineral aggregates and also upon the density and absorption of asphalt soil mixtures.

Experimental Bituminous Construction.

On November 6, Mr. Hubbard inspected an experimental section of an asphalt soil road laid in St. Louis County, Mo., by John Baker, Jr. This road, which has been down for a number of months, was composed of a mixture of oil asphalt and soil which had been subjected previously to a vacuum treatment and afterwards mixed with hot asphalt cement in the presence of steam under boiler pressure. The mix was made by means of a single pug mixer in an air-tight compartment. Samples were taken of the pavement and also of some mixes made in exhibition runs and these have been examined in the Chemical Laboratory of the Office.

On November 8, Mr. Hubbard inspected tar surface treated gravel roads at Camp Travis and also roads in the vicinity of San Antonio, Texas. The work in this locality consists in general of a double treatment with two grades of tar. The results so far obtained are exceedingly satisfactory under existing local conditions.

On November 10, Mr. Hubbard inspected bituminous surface treated roads at Camp Gordon, Georgia.

Standardization of Tests of Bituminous Materials.

The necessary mechanical equipment has been purchased to enable the Office to prepare a large number of the new type penetration needles for determining the accuracy of semi-solid and solid bituminous materials. It is hoped that these needles will be adopted as standard by various state highway testing laboratories as they have already been adopted by the American Society for Testing Materials.

Nonbituminous Road Material Investigations.

During the latter part of October and the early part of November, Dr. Ladd inspected portable stone quarrying, crushing, and screening outfits and intermittently worked quarries at numerous points in Eastern Massachusetts. He is at present engaged in the preparation of a bulletin upon the manufacture of crushed stone for road building in small plants.

Messrs. Jackson and Mitman are preparing a bulletin upon commercial sizes of broken stone produced at quarries in the New England and Middle Atlantic States. It is hoped that this bulletin will be ready for the printer shortly after the first of January.

Investigations have been continued in connection with the standard rattler test for paving brick and preliminary results noted in the last field letter have been confirmed. It seems highly advisable that this test be revised.

Concrete Investigations.

At Arlington Farm tests are being continued on a reinforced concrete slab of 15-foot span length and 20-foot width, having parapet sides. Preliminary results indicate that the parapets have a much greater strengthening effect than was ordinarily calculated. With the return of Mr. Fairbanks to the division it is expected that this work will be pushed rapidly.

Soil Pressure Investigations.

The soil pressure work is being continued and additional measurements have been taken on the 16th Street bridge. From the readings so far obtained it is shown that the pressures vary as the ordinates to a straight line from the maximum pressure at the bottom to the top of the fill, the depth of which

is 19 feet. Laboratory determinations are now being made of the physical constants of the filling material back of this wall.

The standpipe pressure tests on hydraulic fills are being continued and the pipe has been covered to prevent freezing during the winter. Up to the present time the mud in the bottom of the tank appears to act almost as a liquid and the vertical pressures are practically identical with the lateral pressures.

DRAINAGE INVESTIGATIONS.

Administration.

Between November 26 and December 11, S. H. McCrory conferred with the State Geologist at Lansing, relative to suggested cooperative studies in Michigan; he examined lands near Donaldsonville, Louisiana, where it has been proposed to conduct irrigation and drainage studies; and discussed with the following engineers the work of which they have charge: D. G. Miller at South Chicago; C. E. Ramser at Jackson, Tenn.; O. G. Baxter at Little Rock; Charles Kirschner at New Orleans; G. A. Hart at Montgomery; J. V. Phillips at Athens, Georgia; F. G. Eason at Charleston.

Frank O. Bartel of Minnesota has been appointed junior drainage engineer and has reported for duty.

Captain H. H. Barrows has been assigned to the 302d Regiment of Engineers, Camp Upton, L. I.; Captain G. R. Boyd to 303d Engineers, Camp Dix, New Jersey; Captain J. R. Haswell to 23d Engineers, Camp Meade, Maryland; Captain L. A. Jones to 102d Regiment, Camp Wadsworth, South Carolina, Lieutenants O. C. Ayres and W. B. Booth have been assigned to foreign service.

Construction, Operation, and Maintenance.

Bids made in August upon tile f.o.b. Rosslyn, Virginia, in car lots, ranged,

For 4-inch tile,	...	$36.38	to	$45.00	per M.
" 5-inch "	...	48.50	"	58.50	"
" 6-inch "	...	63.00	"	80.20	"

Glazed sewer pipe Y's were bought at factory, Alexandria, Virginia, for-

15" x 10" Y's	.....	$1.62 each
15" x 6" "	.....	1.62 "
10" x 6" "	.....	.96 "
6" x 4" "	.....	.48 "

A 15-inch calso tide gate with 20 feet of 15-inch corrugated pipe cost $38.

H. M. Lynde submits quotations made in October, on Calco automatic gates, and corrugated pipe, f. o. b. East Point, Georgia, as follows:

8-inch;	gate only,		$3.30;	Galvanized pipe		$0.99 per foot.	
10- "	"	"	4.65;	"	"	1.17	"
12- "	"	"	6.85;	"	"	1.35	"
15- "	"	"	9.65;	"	"	1.65	"
18- "	"	"	15.20;	"	"	1.85	"
21- "	"	"	20.60;	"	"	2.14	"
24- "	"	"	24.40;	"	"	2.51	"
30- "	"	"	43.50;	"	"	3.95	"
36- "	"	"	66.50;	"	"	4.65	"
42- "	"	"	93.00;	"	"	5.20	"
48- "	"	"	120.00;	"	"	6.50	"

A contract for installing about 60,000 feet of tile in Beaufort County, North Carolina, gives the contractor a house with 3 or 4 acres for small crops, and 4 cents per linear foot for placing 4-inch to 6-inch tile average 3 feet deep, with 50 cents extra for each stump on line. The tile are delivered along the trench.

In Colleton County, South Carolina, in November, on a tile project of considerable size difficulty was being experienced in getting labor at 2 1/2 cents per linear foot for trenching, laying, and backfilling for 4-inch tile placed 3 feet deep in Norfolk sandy loam with clay subsoil. On another large project in the same locality, with soil similar except for sandy subsoil in places, 1 3/4 cents per foot was being paid for trenching and laying only.

The same manufacturer quoted, for delivery in Hampton County, South Carolina, $27.50 and $35 per M. for 4-inch tile, the agent suggesting it would be economy to use the $35 grade. One of the engineers inspected tile from that manufacturer, delivered in another state, at $27.50 per M; it was salt glazed tile, of poor grade, badly misshapen.

For delivery at Charleston, South Carolina, a nearby factory in August quoted 4-inch tile at $23.00 and 6-inch tile at $39.32 per M. and in October quoted $47.00 on the 6-inch tile. Trenching, laying, and backfilling cost 3 1/2 cents per linear foot, not including contractor's profit, in sandy loam underlain by clay and sand.

Construction in Panther Creek Drainage District, Kentucky, is reported to have been contracted at 10 cents and 15 1/2 cents per cubic yard; loose rock at 70 cents, $1.50 if blasting is required; cleaning right of way, $30 per acre. Other bids were at 7 to 22 cents per cubic yard.

Farm Drainage.

From November 15 to December 11, 35 new farm drainage reports were received from the field and 16 were transmitted to the parties interested.

O. G. Baxter conducted a terracing demonstration in Miller County, Arkansas, at request of the County Agent.

J. V. Phillips addressed a meeting at Fairburn, Georgia, upon agricultural drainage.

W. G. Eason spent two weeks in North Carolina, relieving H. M. Lynde of part of the many requests for assistance filed at the Raleigh office.

Overflowed Lands.

At the request of the property owners, computations are being made for an alternate plan of relief for the lands on Clear Boggy River, Okla.

Report Transmitted: Point Drainage District, Henderson County, Ky., (preliminary) by Edward C. Thomes.

Reports Received: Faulkner Drainage District, Caroline County, Md. (preliminary) - by F. F. Hendee
Dutchman and Little Dutchman Creeks, Iredell County, N. C. (preliminary) by H. M. Lynde.

Irrigation in Humid Region.

F. W. Stanley has prepared a plan for sewage irrigation at Vineland, New Jersey, and is developing an automatic valve to control the distribution to the irrigated plots.

A study is being made of the feasibility of irrigation for rice cultivation a considerable area along the Calcasieu River in southwest Louisiana.

IRRIGATION
Administration.

The Civil Service Commission has announced January 9 as the date of the examination for Junior Irrigation Engineer mentioned in last month's field letter.

W. G. Sloan, Drainage Engineer, has been ordered to report at one of the officers' training camps January 5. F. L. Peterson, Irrigation Engineer, for several years in charge of the work in Nevada, and more recently in a per diem status, has been commissioned as a Captain and is stationed at one of the camps as a blasting expert. H. C. Dixson, Irrigation Engineer, has received permission from the Secretary to apply for a commission in the Engineer Officers' Reserve Corps.

F. J. Veihmeyer, Irrigation Engineer, has requested a furlough to enable him to accept a place as assistant professor of irrigation investigations in the University of California, effective January 1.

Utilization of Water.

Dr. Fortier is about to initiate a new project dealing with the effective water-holding capacity of irrigated soils, and tentative outlines for the work will be sent to the field force within a few days for suggestions, criticism, and data. The essential features of the investigations

will be concerned with the proper amount of water to apply at each irrigation, and will include the necessity of maintaining soil moisture above the wilting point and of applying a surplus of water at each irrigation, the amount of water required for alfalfa at each irrigation when grown on sandy soil, loam soil, etc., and the amount of water required for cereals and in turn for other staple crops on different types of soils.

Additional data on duty of water investigations in Arizona, to accompany a report previously submitted by him, has been submitted by P. E. Fuller, Irrigation Engineer.

C. G. Haskell, Irrigation Engineer, investigated the possibilities in a proposed reclamation scheme involving cut-over lands on Trinity River east of Houston, Texas. Both irrigation and drainage are involved, and the land is in out-of-the-way part of the state, but Mr. Haskell anticipates extensive development of the valley.

Appliances and Equipment.

V. M. Cone, Irrigation Engineer, has submitted a report on a series of tests conducted at the Fort Collins laboratory to determine the fitness of an automatic recorder of the pressure gage type to do the work of automatic water registers. Two instruments of this type were tested against 4 registers of the various types used in this division for several years, and all were checked throughout the tests against hook gages. The tests showed closely consistent records from the registers, but a wide variation from these by the pressure recorders, which seemed to be affected to a marked degree by temperature and other changes.

Flow of Water.

F. C. Scobey, Senior Irrigation Engineer, stopped at Los Angeles, Cal., en route to Berkeley from Washington, to locate metal pipes desirable for testing in the flow of water experiments to be resumed in the spring.

Customs, Regulations, and Laws.

R. P. Teele, Irrigation Engineer, has prepared an abstract of the laws relating to the adjudication of the water rights of all the western states, which is to be used in the work with the Utah Irrigation Commission in drafting a water code for that state.

F. G. Harden, Irrigation Engineer, is working on the draft of a drainage law to be based on his own studies and the replies to the questionnaire sent out last spring. The law so far drafted has been made to apply to Utah conditions in particular.

Dr. Fortier, R. P. Teele, and P. A. Ewing have been invited by the Director of the Census to attend a conference to be held late in December, to discuss preliminary plans for a census of irrigation to be taken in connection with the Fourteenth decennial census.

Drainage of Irrigated Lands.

L. T. Jessup, Junior Drainage Engineer, has been detailed to make a preliminary survey of the outlet of Lake Pend d'Oreille. The surface of this lake has a seasonal fluctuation of about 22 feet and during its high stage the water of the lake covers over 30,000 acres of agricultural land. The purpose of the survey is to determine the feasibility of increasing the carrying capacity of the outlet of the lake in order to reduce by some 12 feet, the present high water stage.

R. A. Hart, Senior Drainage Engineer, and F. L. Bixby, Irrigation Engineer, made a trip over the Lower Humboldt River in Nevada during the first part of December with a view to the installation of test wells to record the fluctuations in the ground water level of the Lovelock and other valleys preparatory to a drainage survey and construction.

RURAL ENGINEERING.

Administration.

J. E. Crux, temporary draftsman, resigned to take a position in the War Department.

The temporary appointment as draftsman, of John A. Cook, expired November 19. He has received an appointment in the Aviation Section of the Signal Corps.

George L. Edick has reported as a draftsman. Mr. Edick headed the eligible list resulting from the Rural Engineering Draftsman's examination held October 2. He comes from the Louden Machinery Company, Fairfield, Iowa, where he was employed as draftsman on farm structures and equipment.

Domestic Water Supply and Sewage Disposal.

The last of the illustrations for the bulletin on "Farm Domestic Water Systems", were completed and submitted.

Routine correspondence was handled and considerable information on water supply and sanitation given to persons visiting the Office.

Farm Structures.

The working drawings for a green house to be erected on the Arlington Experiment Farm for the use of Cereal Investigations, Bureau of Plant Industry, were completed and submitted for final approval.

Revised sketches for the Office of Public Roads and Rural Engineering laboratory, to be erected at Arlington, have been completed and the working drawings have been started.

The drawings for a milk house and a general barn, prepared before the organization of this Division, have been retraced on standard sheets.

The installation of the 10-ton crane in the Color Investigations Laboratory at Arlington, has been completed.

Mechanical Problems.

Data on farm machinery, especially as relating to adjustments, care and repair, have been furnished the Office through the cooperation of the National Implement and Vehicle Association.

Outlines have been prepared for some of the proposed series of bulletins on the care and repair of farm machinery.

The survey has been completed and the data worked up by A. M. Daniels, for the hydro-electric plant near Vienna, Virginia, mentioned in last month's News Letter. It was found that to provide a plant of 3 K. W. capacity, at least a 10-foot dam was necessary as as the topography of the adjacent land is such as to cause danger of possible flooding above the dam, the proposition has to be given up as inadvisable.

Changes were incorporated in the experimental compressed air spraying outfit and tests proved satisfactory. The apparatus was dismantled and is now being reassembled. It is expected that the weight will be reduced between 25 and 40 per cent.

A text, accompanied by drawings, explaining the operation and wiring diagrams for vibrating-stroke bells of the circuit-breaking type, was prepared for use with correspondence.

A short article dealing with the condition of ice houses and the storing and packing of ice, was prepared for submission to the Office of Information.

Consultations were held and correspondence has been handled relating to the following subjects:

Ice House Design and Construction,	Farm Electric Plants,
Construction of Farm Fences,	Electrical Appliances,
Power Development of Streams,	Rotary Tillers,
Farm House Heating Systems,	Farm Machinery,

Farm Tractors.